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AN EXAMINATION OF RISK ALLOCATION PREFERENCES IN PUBLIC-PRIVATE PARTNERSHIPS IN NIGERIA

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ABSTRACT

Risk allocation preferences are important elements of Public-Private Partnerships (PPP), as the fundamental tension in many negotiations between the public and private sector in PPPs usually comes down to the question: who is responsible for managing a particular risk? Yet research literature suggests that risk allocation preferences phenomena have not been adequately studied; hence they remain poorly understood. This paper provides an empirical analysis and study of risk allocation preferences in PPPs in Nigeria.

Research participants (spanning banking, construction, and public sector groups who were selected through a convenience sampling method) completed an online survey with Likert-type items within six months (i.e. between June and November 2011) to gauge probabilities of occurrence, risk impact and risk significance of 46 risk factors pertaining to PPP projects. As data did not meet the assumptions for parametric statistics, Mann-Whitney U tests were performed to evaluate the ranked differences in the independent variables (46 risk factors) between private and public sector groups.

This paper shows that 27 (59%) out of the 46 risk factors are preferred to be allocated to the private sector, while 8 (17%) risk factors are to be allocated to the public sector and 11 (24%) of the risk factors are to be equally shared between the private and public sectors.

Key words: Risk Allocation Preferences, Nigeria, Agency Theory, Public-Private Partnerships, and Mann-Whitney *U* tests.

1. INTRODUCTION

All over the world, there is a growing appetite for Public-Private Partnership (PPP) as a vehicle for the delivery of public infrastructure projects. This model aimed at harnessing private sector capital and efficiency gains by allocating risks to the party best able to manage them optimally.[1] Proponents of the PPP model believe that a genuine transfer of risk to the private sector must be done to support the overriding principle that a project must provide value-for-money to the taxpayer. This principle is hinged on the risk transfer argument that compensates for higher cost of capital used by private sector partners (Akintoye and Beck, 2009).[2] It is widely believed that PPP is an effective approach to enhance infrastructure project delivery by bringing in management efficiency and creative skills from the business world, and reducing public sector involvement by using private sectors in the provision of infrastructure services. In other words, its usage is largely driven by the belief that governments should 'steer more and row less'.

Given that PPP can be viewed as a bundle of rights, obligations and risks are allocated among various project participants; at issue in the design of every PPP contractual structure is how public and private partners can price and optimally allocate risks between themselves.[3] In other words, the assessment of risk and who is best able to manage it needs

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[1] In 1992, the UK embarked upon a new type of PPP, known as the Private Finance Initiative (PFI). Under this arrangement, the private sector firms take on the responsibility for providing a public serve including maintaining, enhancing or constructing the necessary infrastructure required. The essential feature of PFI is that the infrastructure is built and owned by the private sector, the public sector purchasing the flow of services (directly or indirectly) from the asset rather than the infrastructure asset that provides the services.

[2] Much of the case for PPP rests on the relative efficiency of the private sector. While there is an extensive literature on this aspect, the theory is ambiguous and the empirical evidence is mixed. However, PPP are more likely to result in efficiency gains that offset higher private sector borrowing costs if they have the following three characteristics: a) the quality of services can be readily defined and measured; b) there is adequate risk transfer to the private sector, and c) there is either competition or incentive-based regulation. See IMF 2006 report titled: "Public Private Partnerships, Government Guarantees, and Fiscal Risk" prepared by a Staff Team Led by Richard Hemming. In general, infrastructure project finance is usually held to be more expensive than public debt; indeed the rates paid by project sponsors are usually higher than rates paid by government debt (Robin, et al. 2010).

[3] It is crucial to have in contracts which party is to bear the financial liability for risks should they eventuate or crystalize.

to be carefully considered in the design of PPP contracts. It can therefore be argued that the real success of PPP projects depends on the degree to which risk is genuinely transferred from the public to the private sector and optimally shared (Hodge and Greve, 2005).

The questions of risk allocation preferences in the design of PPP contractual structure are uniquely important in Nigeria.[4] Arguably, the inability to understand and control for certain critical elements in PPP contract design (such as risk allocation preferences) had accounted for the slow take off of PPP projects in tackling huge infrastructure challenges in the country.[5] For instance, statistical evidence shows that only 51 projects amounting to $21 billion reached financial and contractual closure between 1990 and 2008 in Nigeria out of which three have been cancelled[6]; and not all of the projects were executed using PPPs.

The objective of this paper therefore is to identify preferred risk allocations in PPP projects in Nigeria. The aim is to better understand risk allocation preferences of parties so as to eliminate lengthy contract negotiations in PPPs. The rest of the paper is organized as follows: sections two and three review the existing literature on risk allocation preferences, particularly within the agency theoretic framework, section four reviews the methodology, section five presents the results and discussions thereon while section six presents the conclusions and recommendations.

2. RISK ALLOCATION PREFERENCES

A core principle of any PPP is the allocation of risk to the party best able to manage it at the least cost. The aim is to optimize rather than maximize risk transfer, to ensure that best value is achieved. A party must be willing to accept a risk based on risk pricing and subsequent negotiations on risk allocation. It bears mentioning therefore that one of the critical 'Value for Money' (VFM) drivers in a PPP transaction is the transfer of risks to the private sector (others are, whole-of-life costing, innovation, earlier project delivery and asset utilization, Hayford, 2006). However, this transfer of risk comes at a price, and attempts to transfer risks, which the public sector is better placed to manage than the private sector can damage the VFM proposition of a PPP transaction. The transfer will only improve VFM if the price charged by the private sector to manage the risk is less than what it would cost government to manage the risk itself.

In PPPs, the risk allocation is usually more complex than the traditional construction contracts, where the demand risk, for example would typically be borne by the government, (i.e. where government is the procurer of projects e.g. roads, hospitals etc.) Identification, disclosure and appropriate allocation of risk are therefore critical to the PPP environment. Generally, there are mixed and divergent views on how partners prefer various infrastructure project risks to be allocated in PPP contracts. For example, Grimsey and Lewis suggest that it is more appealing for the government to shift project risks from the public sector to the consortium involved with the project even though this requires a profit incentive to be provided to the project consortium. They argue that the transfer of risks to the private sector provides an incentive for private entities to maximize efficiency. But for this transfer to happen, a clear property rights must be created (2004).

Engel et al. (2010) for instance shows that with financing considerations, it is optimal to transfer demand risk to the government. They argue that since PPPs involve large upfront investments, exogenous demand risk is an important concern of lenders when user fees are the main revenue source, so by assigning it to the government, the risk and therefore the interest rates charged to the project fall. However, even when projects are based on

[4] Crucially too, the exercise of risk allocation is one of the most important steps in assessing and developing the bankability of PPP projects. In particular, transferring to the private sector partner the risks that it is better able to control or mitigate can help lower the overall project cost, and improve value for money. However, the more total risk transferred to the private sector partner, the higher the return- or risk premium- the equity investors will require, and the harder it will be to raise debt finance or the less bankable the project will become.

[5] In Nigeria, the collapse of public infrastructure is obviously one of the most discussed issues by policymakers and concerned stakeholders. Clearly, the challenges are legion: roads have become death traps, epileptic power supply, decrepit rail system, unreliable security system, substandard airports, poor health and educational institutions among others. For instance in the power sector, Nigeria, a country of over 150 million people is still generating less than 3,500 megawatts, whereas Alberta, a province to 3.5 million Canadians is generating about 13,000 megawatts. USA with a population of 308 million people generates 700,000 MW, South Africa generates 40,000 MW for its 50 million people, and Brazil generates 100,000 MW for its 192 million people. See Alberta Electric System Operator's report titled "Powering Albertans" Volume 4 issue 1, www.allafrica.com accessed on April 20, 2010: report titled "Nigeria: As Power Generation drops to 3,200 MW" and a report presented by Ayo Gbeleyi, Director General – PPP Office Lagos titled "Powering Africa's Megacity" November 18, 2009.

[6] See-The World Bank's database on private participation in infrastructure- http://ppi.worldbank.org/

availability payments (and thus there is no demand risk), the finance rates charged PPPs are higher than the rates charged on government debt. In this case, the higher rate reflects in part the risk that the infrastructure will be unavailable at some point in the life of the contract, and no payments will be received to service the debt.

Li et al. (2005) recommend a risk allocation framework, in which the public sector client retains political risks and the risk pertaining to project site availability. According to this study, both the public sector client and private sector contractor should share the risks pertaining to general legislation, *force majeure* and relationship, while the contractor should take most of the project risks. The allocation of some risk factors, like obtaining project approval and permit, varies with different projects, and depends on prevalent circumstances.

The underlying assumption of risk aversion forms the basis of understanding the risk allocation preferences of partners. This suggests that partners can generally avoid or shift certain risks even when *prima facie* they are best able to manage them. This runs contrary to the notion of optimism bias[7] where partners would deliberately downplay risks embedded in infrastructure projects in order to move forward with the business case for the project and then turn around in an opportunistic manner to request for a contract renegotiation; usually without a competitive tension typical of the original bidding process thereby eroding value for money.

Public partner may exhibit low perception for risks (risk aversion) when its assessment of risk management capability of the private sector partner is low. In that case it may not want to share in certain types of risks such as demand risks (with user fees). Nevertheless, it is important that risk allocation be symmetrical: in other words, if one party accepts the consequences of a downside risk, it should also gain the benefits of an upside risk (Grimsey and Lewis 2004).

Since stakeholders have a significant impact on decisions made in the ongoing management of a PPP project, it is important to understand their preferences in the allocation of project risks. Risk allocation preferences may vary because of differences in underlying assumptions and interests resulting in disagreements over risk priorities and mitigation strategies. The risk allocation preferences of stakeholders predicted in this study suggests that while most of the endogenous risk factors could be assigned to the private sector partner, the public sector should retain political and site acquisition risks, while relationship-based risks should be shared between the partners.

1. Risk Allocation Preferences and Agency Theory

Agency theory is truly interdisciplinary. It is a general model of social relations involving the delegation of authority, and generally resulting in problems of control, which has been applied to a broad range of substantive contexts across different disciplines. According to the widely cited Eisenhardt, (1989), agency theory has been used by researchers in accounting, economics, finance, marketing, political science, organizational behaviour and sociology. Moreover, Kiser critically x-rays the intellectual evolution of agency theory in three disciplines—economics, political science, and sociology. He argues that agency theory in economics was initiated by the work of Berhold (1971), Ross (1973), and especially Jensen and Meckling (1976) as a way to address problems of control that arise as a result of information asymmetries between agents delegated to carry out tasks that affect the welfare of the principals who delegated authority to them (1999).

There are several good summaries of agency theory in the literature (see for example (Macdolnald, 1984, Eisenhardt, 1989, Petersen, 1993 and Kiser, 1999). Eisenhardt, (1989) in particular distinguished between two paradigms of agency theory: positive agency framework and principal-agent framework. Positivist researchers have focused on identifying situations in which the principal and agent are likely to have conflicting goals and then describing the governance mechanisms that limit the agent's self-serving behaviour. Positivist research is less mathematical than principal-agent research. Also, positivist researchers have focused almost exclusively on the special case of the principal-agent relationship between owners and managers of large, public corporations (Berle & Means, 1932, Eisenhardt, 1989). Along this line, agency theorists have identified a number of variables that influence the relationship between the risk preferences of owners and managers: risk attitudes of the principal and agent, outcome uncertainty, and information systems (Eisenhardt, 1989).

The positive branch of agency theory has much in common with the basic hidden action model (moral hazard). Both are primarily concerned with the design of appropriate governance and control mechanisms, though the positive branch has tended to be more

[7] This often occurs when costs are systematically under-estimated and/or when benefits are over-estimated.

narrowly focused on inter organizational relationships such as PPPs. One unique difference in the positive approach however is that it seems to adopt the assumption that agents are risk neutral rather than risk averse, an assumption that is also common in transaction cost economics (Williamson 1988). Generally, the positive branch is non-mathematical and empirically oriented and focuses in particular on the effects of market and institutional mechanisms that affect the contracting process. The tension between the two branches of agency theory partly results from the different approaches developed by each branch and partly from the fact that the mathematical approach of the principal-agent literature offers little insight "to explain the rich variety of observed contracting practices," and in particular, when it comes to analyzing the effects of market and institutional mechanisms in the forms of contracts. On the other hand, positive theory of agency literature appears to offer better insights to explain the variety of contracting practices and how market mechanisms affect the contracting process. This theory is also more likely to produce practical conclusions in terms of economic policy (Eisenhardt, 1998).

In general however, agency theory broadens the risk-sharing literature to include the so-called agency problem that occurs when cooperating parties have different goals and division of labour (Jensen & Meckling, 1976; Ross, 1973). Specifically, agency theory is directed at the ubiquitous agency relationship, in which one party (the principal) delegates work to another (the agent), who performs that work. Agency theory attempts to describe this relationship using the metaphor of a contract (Jensen & Meckling, 1976 cited in Eisenhardt, 1998). Therefore, the role of risk becomes an important innovation in the economic theory of agency. Economists recognize that agency relations involve not only problems of control but issues of risk-sharing as well (Kiser, 1999).

Essentially, agency theory is focused on resolving two problems that can occur in agency relationships. The first is the agency problem that arises when (a) the desires or goals of the principal and agent conflict and (b) it is difficult or expensive for the principal to verify what the agent is actually doing ex post. The problem here is that the principal cannot verify that the agent has behaved appropriately. The second is the problem of risk sharing that arises when the principal and agent have different attitudes toward risk. The problem here is that the principal and the agent may prefer different actions because of the different risk perceptions. To be clear, the two key elements of agency theory are goal conflict (incongruence) and information asymmetry; they are the spark plugs that power the theory.

On the first agency problem: several conflicting goals inherently exist among the three major constituencies involved in public-private partnerships; thus leading to compounded agency problem: i.e. public sector operating as the contracting authority, the private sector and the consumers or end users of services. The public sector partner for example has the goal of job creation and increasing services to the public[8]; the private sector organization's goal is to maximize the value of the firm; and the consumers' goal is to maximize consumer surplus.

Theoretically, in PPPs, the private firm is an agent for the public organization, in providing a piece of infrastructure, and the public organization is an agent for the consumers, who finance the public organization through taxes and fees. Thus, the public organization is accountable to the customers of its own agent. It, therefore, has a responsibility to ensure that the agent acts in the best interests of the consumers.

Engel et al (2010) argue that the life cycle of PPP finance and the change in financing sources is determined by the different incentive problems faced in the two stages of the PPP: its construction and operational phases. Construction is subject to substantial uncertainty; major design changes and costs depend crucially on the diligence of the sponsor and the building contractor. Thus, there is ample scope for moral hazard at this stage. As is well known (Tirole 2006; Yescombe 2007), banks perform a monitoring role that is well suited to mitigate moral hazard by exercising tight control over changes to the project's contract and the behaviour of the special purpose vehicle and her contractors. In order to control behaviour, banks disburse funds only gradually as project stages are completed. After completion and ramp-up of the project, risk falls abruptly and is limited to events that may affect cash flows.

[8] This goal aligns with the Public Interest Theory of Regulation (PITR) analysed in Boardman and Vining (2012). This is a normative perspective and it is different from the Economic Theory of Regulation (ETR) which focuses on what governments *do* do. The basic argument is that governmental action will be based on, or at least significantly influenced by, the self-interest of politicians and bureaucrats: such as seeking to maximise votes or scoring political points. PITR in particular focuses on the presence of market failures and governments' role in correcting these failures. PITR is inherently normative, as it focuses on what governments *should* do.

To deal with adverse selection problems- public sector partner can offer a menu of contracts to private sector bidders at pre-deal stages. The public client (principal) would express its expected risk allocation framework (i.e. initial risk matrix) along the invitation to negotiation/tender document, by setting out a list of the main risks contained within the scheme, and bidders are required to specify their views on:

- The probability of each risk event occurring;
- The cost consequences (impact), if the event did occur; and
- Whether they were prepared to take all, or part of the risk, within their bid price.

The individual bidders (potential agents) would assess the client's proposition and either agree or disagree. Ultimately, the iterative evaluation of risks by these agents enables them to reach a decision on whether they should bear certain risks or part of certain risks or not. Furthermore, having assessed and mitigated all risks, the PPP contract would invariably reflect the final allocation of risks between the private and public sector partners (Akintoye et al, 2003).

Another important element of agency problems in PPPs is the tendency to result in some self-selection. This is common where unsolicited bids are considered by governments: for instance, a risk-averse agent (private sector) may want to get government engaged in the Special Purpose Vehicle (SPV) by creating a rosy picture of a project or underplay the risks in a project. In that case, the government may succumb particularly where it doesn't have a clear framework for dealing with unsolicited bids or where it is fully 'sold out' based on the optimism bias of the private sector. It is crucial to also note that agency theory overlaps contract theory because the unit of analysis is the contract governing the relationship between the principal and the agent. The focus of agency theory is on determining the most efficient contract governing the principal-agent relationship given assumptions about people (e.g., self-interest, bounded rationality, risk aversion), organizations (e.g., goal conflict among members), and information (e.g., information is a commodity which can be purchased).

In conclusion, drawing from the perspectives of the agent theorists, the following pattern of risk allocation could be predicted between the public and private sector partners: the risks that are solely within the control of private sector are allocated wholly to the private sector (such as demand risk under a user-fee regime, design risk etc.), while the risks that are solely within the control of the public sector are allocated wholly to the public sector; where risks are partly controlled by both parties, such risks are shared.

3. METHODOLOGY

The purpose of this quantitative study is to show how stakeholders involved in PPPs prefer risks to be allocated. Responses were received from 45 participants with varied interest and/or experience with PPPs and the survey was administered between June and November 2011. In all, 285 professionals in the Nigerian PPP space were invited to participate in the study.

Out of about 285 questionnaires administered to respondents between June and November 2011 through Qualtrics, 45 responded, while 1 of the responses is invalid.[9] Although only 45 samples were collected, the number of samples was deemed adequate and representative when compared with other similar studies on risk management in infrastructure projects. For example, 35 responses were obtained in Kartam and Kartam (2001)'s questionnaire survey on risk management in the Kuwaiti construction industry; and 92 survey responses were collected by Rahman and Kumaraswamy (2004) on joint risk management in Hong Kong. In the only similar study carried out (to the learner's knowledge) in Nigeria so far (i.e. Ibrahim et al. 2006), 42 questionnaires were returned out of the 150 distributed, of which only 36 are usable. This represents a 24% effective response rate. Moreover, 70 responses were collected in El-Sayegh's research on risk assessment and risk allocation in the construction industry of the United Arab Emirates (2008). Also in a recent and similar study i.e. (Ke et al. 2010) a total of 47 completed questionnaires were returned representing a response rate of 23% in China's PPP projects. Lastly, in the most recent study (also in China's PPP projects), Chan et al. (2011) sent out a total of 580 questionnaires and received a total of 105 valid responses for data analysis representing 18% response rate.

[9] Qualtrics is an online survey platform used by scholars from different institutions including Haskeyne School of Business at the University of Calgary.

Convenience sampling technique (non-probability) was used to draw participants to the study. Here, sampling was done on the basis of availability and ease of data collection while also paying close attention to the suitability of participants. The "captive samples" (group of individuals who are accessible to the investigator) for the survey in this study was drawn largely from the banking sector; although participants cut across the three selected stakeholder groups: Financiers, Clients (Public Sector) and Operators (Private Sector). This type of sampling method is called judgement sampling and is a variant of purposive sampling or non-probability sampling technique.

Questionnaire survey is the most common research method used to obtain a risk-allocation scheme in PPPs. For instances, Li et al. (2005) developed a preferred risk allocation scheme for PPP projects in the United Kingdom based on an opinion survey with 53 suitable responses; Roumboutsos and Anagnostopoulos (2008) conducted a similar survey using the same questionnaire in Greece and compared the findings to those in the UK; Jin and Doloi (2008) gathered data from an industry-wide survey to test the theoretical framework for understanding risk allocation practice in PPP projects. To increase the confidence level, the sample size for the survey was pegged at a minimum of two hundred (200) survey participants.

Statistical Statistical Package for the Social Sciences (SPSS), 20.0 was the main research analysis tool. The results of the research are presented in section five below.

4. RESULTS AND DISCUSSIONS

A thorough analysis of responses was used to gauge how to allocate each risk factor to different parties under PPPs. Precisely, the questionnaire was divided into two sections. The first section asks respondents to give their consent for voluntary participation in the study and draws key background information from respondents such as: sector, experience with PPP, managerial experience and PPP sectoral experience. The main purpose of this section is to collect useful background information of the respondents to conduct subsequent comparative analyses in the study.

The second section solicits information on risk probability, risk impact and specific allocation preferences of the 46 risk factors between private and public sectors. For robustness, a six-point Likert scale is used as a measurement scale for both the gauging of risk probability and risk impact. Regarding the probability of occurrence a six-point Likert scale ranges from 0-5, where, nil = 0, 1 = remote, 2= occasional, 3= probable, 4 = frequent and 5= very frequent. Regarding the severity of each risk factor, a six-point Likert scale ranges from 0-5 where, 0 = the impact is nil, 1= impact is negligible with no serious influence on the project, to 5= where impact is catastrophic, where the project would be aborted.

Regarding the risk allocation, participants were asked to allocate the 46 risk factors to either the private or the public sector, or describe it as preferably 'shared' between the public and private sector, where PB = public sector, PV = private sector, and SH = shared. The respondents needed to meet two criteria before being invited to participate in the survey, which include (1) having extensive working experience within the infrastructure industry in Nigeria, and (2) having been involved in the management of PPP projects in Nigeria or at least have some knowledge and/or interest in the topic of PPP as practitioners. To be sure the participants are well knowledgeable and have some experience in PPPs, all respondents were required to currently hold or to have held management positions in the past either in the private, public or banking sectors. The varied practical working experience and relevant organizations of the identified practitioners as analysed below indeed uphold and reinforce the validity of this study.

The preferred risk allocation of PPP projects in Nigeria between mainly the public and private sectors and other important stakeholder groups is analysed based on the calculated mean ratings, as shown in Table 1. The mean responses under each factor with corresponding standard deviations are equally presented. These mean responses range between 1 and 3: with 1 representing public, 2 shared and 3 private. Note however that the mean value and standard deviation of possible responses on each risk factor are 2 and 1 respectively.

The formula below, which is based on the *assumed* distribution of the normal distribution curve, is used to calculate the ranges within which PPP risks in Nigeria should be allocated to the contracting parties, i.e., 1 = mainly to the public sector, 2 = equally shared between the public and private sectors, and 3 = mainly to the private sector, corresponding to PB, SH and PV respectively in the survey (Chan et al. 2011) using:

$$X_{10\%} = U \pm Z^{*}\sigma$$

Where $X_{10\%}$ = the values of upper and lower limits within which the risk should be allocated to a specified party; U = the mean value of the population, Z = corresponding Z value as computed from the normal curve table; σ = population standard deviation. Here, the mean value is 2, and the range for 'equally shared' is between 1.875 and 2.125. Therefore, taking 0.125 as the corresponding Z value and standard deviation of 1 for this calculation, the lower and upper limits for the range are 1.875 scores and 2.125 scores, respectively. Hence, if the mean value is lower than 1.875 scores, the risk should be mainly borne by the public sector. If the mean value is between 1.875 scores and 2.125 scores, then the risk should be equally shared between the public and private sectors. If the mean value is greater than 2.125 scores, the risk should be mainly borne by the private sector.

Some sensitivity tests were carried out to see if the risk allocation preferences would alter significantly, using two standard deviations as opposed to using only one. Still following the logic of normal distribution curve, with the mean value remaining at 2, the range of 'equally shared' risk factors represent mean scores lying between 1.836 and 2.164. Hence, if the mean value of any risk factor is lower than 1.836 scores, the risk should be borne exclusively by the public sector. If the mean value lies between 1.836 and 2.164 scores, then the risk should be equally shared between the public and private sectors. However, if the value is greater than 2.164 scores, then the risk should be borne by the private sector. The results of these tests show that risk allocation preferences remain largely the same and merely altered for 6 out of the 46 risk factors considered in this study.

This approach for determining risk allocation preferences is considered more reliable and accurate than those applied in similar studies (Li et al. 2005; Andi 2006; El-Sayegh 2008). For example, their method of determining risk allocation preferences is dependent on whether the risk factors receive more than 50% agreement from the respondents (i.e. preponderance of opinion). If a risk does not receive more than 50% agreement, it will be christened as "undecided." Such a classification is purely hypothetical and does not reflect the industry practice (Chan et al. 2011).

Table 1 shows that a total of 27 out of the 46 risk factors are preferred to be allocated to the private sector, representing 59% of the total risk factors; these risk factors are: (1) poor financial market, (2) lack of tradition of private provision of public services, (3) geotechnical conditions, (4) weather, (5) level of demand for project, (6) availability of finance, (7) financial attraction of projects to investors, (8) high finance costs (9) residual risks, (10) design deficiency, (11) unproven engineering techniques (12) construction cost overrun, (13) construction time delay, (14) material/labour availability, (15) late design changes, (16) poor quality workmanship, (17) excessive contract variation, (18) insolvency/default of sub-contractors or suppliers (19) operation cost overrun, (20) operational revenues below expectation, (21) low operating productivity, (22) maintenance costs higher than expected, (23) maintenance more frequent than expected, (24) organization and coordination risk, (25) differences in working method and know-how between partners, (26) third party tort liability, and (27) staff crises).

A total of 8 risk factors (i.e. 17% of the 46 risk factors) are to be allocated to the public sector; these factors are: (1) unstable government, (2) expropriation or nationalisation of assets, (3) poor public decision-making process, (4) strong political opposition/hostility, (5) legislation change, (6) change in tax regulation (7) level of public opposition to project, and (8) delay in project approvals and permits. Perhaps as expected, all these risk factors are exogenous (Ibrahim et al., 2006) and fall either directly within government policy arena such that government is a position to manage the events when they crystallize. These results also corroborate with previous findings of Zhang et al (1998) and Li et al. (2005) for studies carried out in Hong Kong and UK respectively.

A total of 11 risk factors (i.e. 24% of the 46 risk factors) are to be equally shared between the private and public sectors; the risk factors are as follows: (1) inflation rate volatility, (2) interest rate volatility, (3) influential economic events, (4) industrial regulatory change, (5) force majeure, (6) environment, (7) site availability, (8) inadequate experience in PPP/PFI, (9) inadequate distribution of responsibilities and risks, (10) inadequate distribution of authority in partnership, and (11) lack of commitment from either partner. Some of these risks are exogenous some are equally endogenous. This outcome negates the core empirical finding of relevant studies reviewed: where less than 10 of the identified risk factors were shared while others are either assigned to the public or to the private sector partner exclusively (see Zhang *et al*; 1998, Li *et al*, 2005; Ibrahim *et al.* 2006 etc.).

One possible reason for the variation in our results and the only comparable study done in Nigeria (i.e. Ibrahim et al., 2006) is the fact that about 80% of the total respondents in this study are from the private sector (banking 64% and other private sectors 16%),

whereas in Ibrahim et al. (2006) bankers were not included at all. Even though by the reason of their core business they should in principle be more risk seeking than other stakeholders; though with caution as the experience of the Nigerian bankers with PPPs is still not very deep as expected in all new PPP environments.

The analyses above show clearly the allocation preferences among the private and the public sectors in Nigeria. The results indicate the impact of the differing level of involvement and experience in PPP in Nigeria; where most of the risk factors are still preferred to be shared between the public and the private sector, contrary to previous studies, particularly a comparable study by Ibrahim et al. (2006) probably because of the composition of the survey respondents where most of the respondents are from the private sector and tend to be relatively more risk-averse. The analysis equally shows that with differing levels of expertise between the private sector operator and the public sector, the allocation preferences suggest that risks should be borne by the party best able to actually reduce the likelihood and impact of the bad outcomes.

When viewed across the various groups, the opinions of all stakeholders are unanimous on 6 out of the 8 risk factors to be allocated to the public sector except, for the risk of change in tax regulation and level of public opposition to project. The risk of public opposition to project is germane and highly significant in Nigeria considering the outcome of the flagship PPP project in Nigeria (i.e. Lekki Road Project), where due to public opposition, Lagos State Government had to cough out the sum of N4 Billion ($25 million) in 2010 from its budget due to shadow toll regime put in place as a result of public opposition to the project (Guardian Newspaper, November 15, 2011).

Likewise, the views of all stakeholders are unanimous on 17 out of the 27 risk factors to be allocated to the private sector, while their opinions are unanimous in only 1 out of the 11 risk factors to be equally shared: i.e. the risk of influential economic events.

Table 1: Results of Risk Allocation Preferences

	All Preferred				Public Preferred				Private Preferred				Banking Preferred			
Risk Factors	N	Mean	SD	Allocation	N	Mean	SD	Allocation	N	Mean	SD	Allocation	N	Mean	SD	Allocation
Unstable Government	44	1.48	0.63	Public	8	1.50	0.76	Public	7	1.57	0.53	Public	29	1.45	0.63	Public
Expropriation or Nationalisation of assets	44	1.52	0.79	Public	8	1.50	0.93	Public	7	1.57	0.98	Public	29	1.52	0.74	Public
Poor public decision-making process	44	1.50	0.63	Public	8	1.25	0.46	Public	7	1.29	0.49	Public	29	1.62	0.68	Public
Strong political opposition/hostility	44	1.43	0.55	Public	8	1.50	0.53	Public	7	1.29	0.49	Public	29	1.45	0.57	Public
Poor financial market	44	2.23	0.64	Private	8	2.00	0.76	Equally Shared	7	2.71	0.49	Private	29	2.17	0.60	Private
Inflation rate volatility	44	1.91	0.68	Equally Shared	8	1.88	0.83	Equally Shared	7	1.86	0.38	Public	29	1.93	0.70	Equally Shared
Interest rate volatility	44	2.11	0.69	Equally Shared	8	2.25	0.71	Private	7	2.43	0.53	Private	29	2.00	0.71	Equally Shared
Influential economic events	44	1.98	0.51	Equally Shared	8	2.00	0.00	Equally Shared	7	2.00	0.58	Equally Shared	29	1.97	0.57	Equally Shared
Legislation change	44	1.57	0.73	Public	8	1.38	0.74	Public	7	1.57	0.79	Public	29	1.62	0.73	Public
Change in tax regulation	44	1.86	0.88	Public	8	1.75	0.89	Public	7	1.86	1.07	Public	29	1.90	0.86	Equally Shared
Industrial regulatory change	44	1.95	0.83	Equally Shared	8	1.88	0.83	Equally Shared	7	1.71	0.76	Public	29	2.03	0.87	Equally Shared
Lack of tradition of private provision of public Services	44	2.16	0.68	Private	8	2.00	0.76	Equally Shared	7	2.29	0.76	Private	29	2.17	0.66	Private
Level of public opposition to project	44	1.84	0.61	Public	8	1.63	0.74	Public	7	1.71	0.49	Public	29	1.93	0.59	Equally Shared
Force majeure	44	2.05	0.53	Equally Shared	8	1.88	0.35	Equally Shared	7	2.14	0.38	Private	29	2.07	0.59	Equally Shared
Geotechnical conditions	44	2.23	0.48	Private	8	2.50	0.53	Private	7	1.86	0.38	Public	29	2.24	0.44	Private
Weather	44	2.16	0.37	Private	8	2.13	0.35	Equally Shared	7	2.00	0.00	Equally Shared	29	2.21	0.41	Private
Environment	44	2.00	0.43	Equally Shared	8	2.13	0.35	Equally Shared	7	1.71	0.49	Public	29	2.03	0.42	Equally Shared
Land acquisition (site availability)	44	1.89	0.84	Equally Shared	8	1.50	0.76	Public	7	2.00	1.00	Equally Shared	29	1.97	0.82	Equally Shared
Level of demand for project	44	2.25	0.58	Private	8	2.13	0.64	Equally Shared	7	2.43	0.53	Private	29	2.24	0.58	Private
Availability of finance	44	2.43	0.59	Private	8	2.38	0.74	Private	7	2.57	0.53	Private	29	2.41	0.57	Private
Financial attraction of project to investors	44	2.52	0.55	Private	8	2.38	0.52	Private	7	2.71	0.49	Private	29	2.52	0.57	Private
High finance costs	44	2.50	0.55	Private	8	2.38	0.74	Private	7	2.57	0.53	Private	29	2.52	0.51	Private

Residual risks	44	2.25	0.58	Private	8	2.13	0.35	Equally Shared	7	2.57	0.53	Private	29	2.21	0.62	Private
Delay in project approvals and permits	44	1.66	0.71	Public	8	1.13	0.35	Public	7	1.57	0.79	Public	29	1.83	0.71	Public
Design deficiency	44	2.45	0.66	Private	8	2.63	0.74	Private	7	2.29	0.76	Private	29	2.45	0.63	Private
Unproven engineering techniques	44	2.57	0.62	Private	8	2.75	0.71	Private	7	2.43	0.53	Private	29	2.55	0.63	Private
Construction cost overrun	44	2.32	0.60	Private	8	2.50	0.53	Private	7	2.43	0.53	Private	29	2.24	0.64	Private
Construction time delay	44	2.32	0.56	Private	8	2.50	0.53	Private	7	2.29	0.49	Private	29	2.28	0.59	Private
Material/labour availability	44	2.57	0.50	Private	8	2.63	0.52	Private	7	2.86	0.38	Private	29	2.48	0.51	Private
Late design changes	44	2.32	0.56	Private	8	2.50	0.53	Private	7	2.29	0.49	Private	29	2.28	0.59	Private
Poor quality workmanship	44	2.48	0.66	Private	8	2.75	0.71	Private	7	2.43	0.98	Private	29	2.41	0.57	Private
Excessive contract variation	44	2.16	0.75	Private	8	2.25	0.89	Private	7	2.29	0.95	Private	29	2.10	0.67	Equally Shared
Insolvency/default of sub-contractors or suppliers	44	2.64	0.61	Private	8	2.63	0.74	Private	7	2.57	0.79	Private	29	2.66	0.55	Private
Operation cost overrun	44	2.45	0.63	Private	8	2.50	0.76	Private	7	2.43	0.79	Private	29	2.45	0.57	Private
Operational revenues below expectation	44	2.36	0.61	Private	8	2.13	0.64	Equally Shared	7	2.29	0.76	Private	29	2.45	0.57	Private
Low operating productivity	44	2.43	0.59	Private	8	2.50	0.53	Private	7	2.29	0.76	Private	29	2.45	0.57	Private
Maintenance costs higher than expected	44	2.41	0.58	Private	8	2.25	0.71	Private	7	2.57	0.53	Private	29	2.41	0.57	Private
Maintenance more frequent than expected	44	2.39	0.62	Private	8	2.63	0.52	Private	7	2.14	0.69	Private	29	2.38	0.62	Private
Organization and co-ordination risk	44	2.34	0.61	Private	8	2.50	0.53	Private	7	2.29	0.76	Private	29	2.31	0.60	Private
Inadequate experience in PPP/PFI	44	2.07	0.50	Equally Shared	8	2.38	0.52	Private	7	2.29	0.49	Private	29	1.93	0.46	Equally Shared
Inadequate distribution of responsibilities and risks	44	2.05	0.57	Equally Shared	8	1.88	0.35	Equally Shared	7	1.86	0.38	Public	29	2.14	0.64	Private
Inadequate distribution of authority in partnership	44	2.11	0.58	Equally Shared	8	1.75	0.46	Public	7	2.14	0.38	Private	29	2.21	0.62	Private
Differences in working method and know-how between partners	44	2.16	0.61	Private	8	2.25	0.46	Private	7	2.00	0.58	Equally Shared	29	2.17	0.66	Private
Lack of commitment from either partner	44	2.00	0.61	Equally Shared	8	2.00	0.00	Equally Shared	7	2.29	0.76	Private	29	1.93	0.65	Equally Shared
Third Party Tort Liability	44	2.20	0.63	Private	8	2.38	0.52	Private	7	2.00	0.82	Equally Shared	29	2.21	0.62	Private
Staff Crises	44	2.32	0.60	Private	8	2.38	0.52	Private	7	2.43	0.79	Private	29	2.28	0.59	Private

5. CONCLUSIONS

The research confirmed that most risks in PPPs are preferred to be allocated to the private sector following the general principle of transferring risks to party in the best position to control the events that may occur: 58% of the risk factors used in this study were to be transferred to the private sector, while 17% of the risks are to be allocated to the public sector, while only 24% of the risks are meant to be shared between the two parties. It means that it is recognized that private sector has better control over events that may deter the achievement of established objectives of PPP projects.

Generally, the principle is to allocate PPP risks to the party best able to control its occurrence or manage their consequences as well as to the party in the best position to assess the probability of the risk crystalizing within a context commercially acceptable to the private sector. However, risk allocation may vary between projects; for example, the tunnelling section of a road construction project may be an unacceptable risk for the contractors, lenders, and investors due to the probability and the impact of the risk as a result of unknown geological conditions.

Risk allocation may also vary between markets depending on the appetite (risk preferences) and the level of competition among players.

In some jurisdictions, certain risks may be allocated by law to the public or private sector for political or historical reasons and any contractual arrangement to the contrary will have no legal effect. Therefore, in practice, legal constraints and the ability of the relevant party to assume a given risk must be taken into account regardless of which party is more efficient at controlling and managing the risks (Farquharson, 2011). Also whilst risk allocation in PPPs generally forces the private sector to bear a significant part of the construction and operational risks, the actual risk allocation may differ from what was originally planned. Infact, empirical evidence supports that risk allocation in practice often departs from what is laid out in theory (see e.g. Lobina and Hall, 2003). As stressed by The World Bank, "whether PPPs perform better than full provision by state-owned enterprises depends in particular on whether performance risk is effectively shifted from taxpayers to the private shareholders of the company that enters into a concession-type arrangement" (2002: 23-24).

Overall, since issues and dynamics of risk allocation may have some similarities across projects, it is preferable and highly recommended for the public sector to have a consistent approach and a clear framework for contracting as well as soliciting and evaluating bids from the PPP contractors. This framework should be enshrined in the policy document and guidelines for PPPs at every level of government that seeks to engage with the private sector in PPPs.

It should also be noted that PPPs are by no means a panacea to all infrastructure challenges. This paper concedes that private sector engagement in the provision of infrastructure should in theory improve the quality of projects get undertaken. However, it is highly unlikely that a politically expedient but financially dubious project would be able to generate enough money to incentivise private sector partners. Experience shows that cost-benefit estimates can sometimes prove wildly optimistic; such that when

projects go bad, leaving half-built roads and schools-they become a public problem. Private investments might well end up being recouped in higher user charges.[10]

One of the practical policy recommendations to this challenge is to run a truly transparent and competitive PPP tender process. Prior to the commencement of a procurement process, it is germane for public entities to strategically approach the market with a well-defined, well-structured and 'well-derisked' PPP projects; failure to do this will result in bidders making bids that are either incomparable with each other or deliberately present low bids with a view to resolving uncertainties through post-bid negotiation or through post-contract renegotiation.

Overall, this research confirmed the views that most risks are meant to be allocated to the private sector partner, while government should still retain some risks such as political risks and site availability. However, suggested areas of further research include, but not limited to the following areas:

- The practical validation of the suggested risk allocation preferences in real life situations and circumstances to see if actual risk allocation will conform to the preferences showed in this study;
- The practical implications of supporting projects with Viability Gap Funding: perhaps it will be interesting to see if this could even compound agency problems in PPPs;
- To test whether cost overruns under PPPs are more or less likely than under traditional procurement using an agency theoretic framework; and
- To examine the factors that could make risk allocation preferences differ across projects.

[10] See "Investing in Infrastructure: A Question of Trust, Chicago Pioneers a New Way of Paying for Infrastructure"(The Economist, May 12, 2012).

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